Assessment

December 2016

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Objectives

By the end of the session the participant will be able to:

1) List and describe the principles of assessment design including:
   - purpose of the assessment,
   - formative or summative,
   - level of performance required,
   - blueprint,
   - standard setting,
   - validity,
   - reliability,
   - utility equation

2) Select an appropriate method of assessment for a given purpose.

3) Apply these principles to written (example; multiple choice questions) and performance based examinations (example; OSCE) relevant to participant's context.

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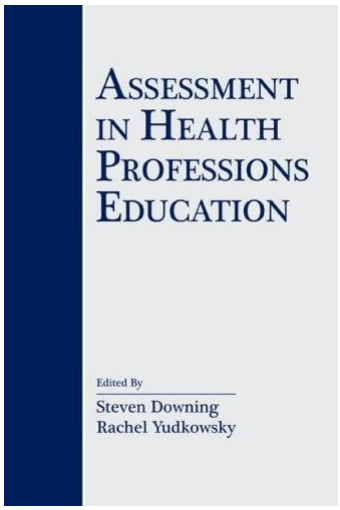

The Psychometric Tradition

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The Psychometric Tradition

- Most significant advances in our field have been in assessment
- Assessment methods analogous to diagnostic tests
  - Disease or no disease
  - Incompetence or competence
- Psychometric methods → designed to ensure that data are sufficiently trustworthy

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Why should YOU care about psychometrics?

- You all indicated an interest in doing research
- Even if ASSESSMENT is not your primary focus…
- Research in education →
  - changing something about how, when, where we teach or we add some new program or curriculum →
    - program EVALUATION

- OUTCOME → Student performance
- TOOL → how good is your tool ???

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For any measurement instrument to be useful

- Reliability
- Validity
- Feasibility
- Acceptability

Context and population in which it is used

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Outline

- Assessment definition and 5 pearls/truths
- 10 questions; cover purpose, formative/summative, blueprint, standard setting…
- Validity
- Utility equation

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What is Assessment?

"Any systematic method of obtaining information from tests and other sources, used to draw inferences about characteristics of people, objects, or programs."

Standards for Educational and Psychological Testing

1999

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Assessment ≠ Evaluation

- Assessment
  - Measure the educational learning in TRAINEES
- Evaluation
  - Measure educational PROGRAMS

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5 Truths about Assessment

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Truth #1 All assessment is a SAMPLE

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Truth # 2

Assess what is important, not just what is easy…

"Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted"

Albert Einstein

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CanMEDS Roles – Assessment of…

- Medical Expert
- Communicator
- Collaborator
- Manager
- Health Advocate
- Professional

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Truth # 3

"Assessment drives learning"

"The curriculum tells you what the faculty is doing; the examination systems tell you what the students are doing"

Geoff Norman

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Truth # 4

All assessment involves assumptions and judgement

Performance→ score→ interpret score → decision

All standard setting involves judgement
Subjective!

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Truth # 5

" Validity is the single most important characteristic of assessment data."

Stephen Downing 2009

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Bloom's Taxonomy

- In 1956, Benjamin Bloom headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning.
- This became a taxonomy including three overlapping domains; the cognitive, psychomotor, and affective.

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Bloom's Taxonomy in Cognitive Domain

1. **KNOWLEDGE (MEMORIZATION)**
2. **COMPREHENSION (UNDERSTANDING)**
3. **APPLICATION (USING)**
4. **ANALYSIS (TAKING APART)**
5. **SYNTHESIS (PUTTING TOGETHER)**
6. **EVALUATION (JUDGING)**

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Bloom's Taxonomy: QUESTIONS' LEVELS

1. **KNOWLEDGE (MEMORIZATION)**
2. **COMPREHENSION (UNDERSTANDING)**
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4. **ANALYSIS (TAKING APART)**
5. **SYNTHESIS (PUTTING TOGETHER)**
6. **EVALUATION (JUDGING)**

I

II

III

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Knowledge (Memorization)

- **FACTS, CONVENTIONS, DEFINITIONS, JARGON, CLASSIFICATIONS, CRITERIA**
- **RECALL OF METHODS, PROCEDURES, ABSTRACTIONS, PRINCIPLES, THEORIES**
- **CORRELATES WITH MEMORIZATION SKILLS BUT NOT PROBLEM-SOLVING SKILLS**
- **NECESSARY BUT NOT SUFFICIENT FOR SOLVING MEDICAL PROBLEMS**

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Knowledge

- **Cite**
- **Count**
- **Define**
- **Draw**
- **List**
- **Name**
- **Record**
- **Relate**
- **Repeat**
- **underline**

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Knowledge (example)

- **Which one of the followings is a component of cardiac conductive system?**

I. **SA node**
II. **Oval window**
III. **Mitral valve**
IV. **Superior vena cava**

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Comprehension (understanding)

- **UNDERSTAND AND GRASP THE MEANING OF KNOWLEDGE**
- **SPEAK OR WRITE ABOUT KNOWLEDGE IN ALTERNATIVE WAYS (PARAPHRASE)**
- **ARTICULATE CONNECTIONS BETWEEN DIFFERENT ITEMS OF KNOWLEDGE**
- **INTERPRETATION OF INFORMATION, SUCH AS EXTRAPOLATION OF TRENDS**
- **NECESSARY BUT NOT SUFFICIENT FOR SOLVING MEDICAL PROBLEMS**

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Comprehension (understanding)

- **Compute**
- **Describe**
- **Discuss**
- **Translate**
- **Express**
- **Identify**
- **Locate**
- **Report**
- **Restate**
- **Review**
- **tell**

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Comprehension (example)

- **Please compare the left and the right column considering relevant activities?**

P wave	**Ventricular cont.**
QT interval	**Atrial cont.**
QRS complex	**Ventricular relaxation**
PQ interval	**SA node conduction**

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Application (USING)

- **USE OF ABSTRACT IDEAS IN PARTICULAR CONCRETE SITUATIONS**
- **REMEMBERING AND APPLYING PRACTICAL IDEAS, PRINCIPLES, THEORIES**
- **SOLVING HOMEWORK PROBLEMS WITH SINGLE SOLUTIONS**

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Application (USING)

- **Apply**
- **Calculate**
- **Dramatize**
- **Employ**
- **Examine**
- **Illustrate**
- **Operate**
- **Practice**
- **Solve**
- **Schedule**
- **Use**
- **Change**

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Application (example)

- **Which one of the following cases will more benefit from Holter monitoring?**

1) Patient with chronic abdominal pain
2) Patient with persistent chest pain
3) Patient with recurrent palpitations
4) Patient with unstable angina

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Analysis (Taking apart)

- **BREAKING DOWN A COMPLEX PROBLEM INTO PARTS**
- **SOLVING EACH PART USING PRINCIPLES, THEORIES, ETC.**
- **DETERMINING CONNECTIONS AND INTERACTIONS BETWEEN PARTS**
- **ANALYZING A CLINICAL SITUATION OR PROBLEM**

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Analysis (Taking apart)

- **Analyze**
- **Appraise**
- **Calculate**
- **Categorize**
- **Compare**
- **Construct**
- **Debate**
- **Diagram**
- **Differentiate**
- **Examine**
- **Question**
- **test**

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Analysis (example)

- **You find a long QT interval in the EKG of an 18 month old baby with unprovoked convulsion, which one of the following electrolyte disturbances better correlates with this condition?**
  - **Hypoglycemia**
  - **Hyponatremia**
  - **Hypocalcemia**
  - **Hypophosphatemia**

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Synthesis (Putting together)

- **PUTTING MANY PARTS TOGETHER TO MAKE A NEW WHOLE**
- **A PROFESSIONAL ACTIVITY REFERRED TO AS DESIGN**
- **AN OPEN-ENDED PROCESS WITH MORE THAN A SINGLE CORRECT ANSWER**
- **CLINICAL DESIGN OF A NEW PLAN OR PROCESS**

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Synthesis (Putting together)

- **Arrange**
- **Assemble**
- **Collect**
- **Compose**
- **Construct**
- **Create**
- **Design**
- **Formulate**
- **Integrate**
- **Manage**
- **Organize**
- **Plan**
- **Prescribe**
- **propose**

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Synthesis (example)

- **A 50 old year old obese man comes to ER. He is complaining from a severe chest pain beginning from 4 hours ago radiating to his left arm. You find an ST depression of more than 5mm on the EKG. Which one of the followings is more compatible with his condition?**

  1) **Pericardial effusion**
  2) **Myocardial infarction**
  3) **Pericarditis**
  4) **myocarditis**

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Evaluation (Judging)

- **MAKING A JUDGMENT ABOUT A SOLUTION, DESIGN, REPORT, MATERIAL**
- **MAY INVOLVE INTERNAL OR EXTERNAL CRITERIA**
- **INTERNAL CRITERIA: BEST MODELS, LOGICAL, FREE OF ERRORS**
- **EXTERNAL CRITERIA: ENVIRONMENTAL, LEGAL, ECONOMIC, SOCIOLOGICAL**
- **SELECTION AMONG CLINICAL PLANS & ALGORITHM FOR IMPLEMENTATION**

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Evaluation (Judging)

- **Assess**
- **Choose**
- **Compare**
- **Criticize**
- **Estimate**
- **Judge**
- **Measure**
- **Rank**
- **Rate**
- **Revise**
- **Score**
- **select**

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Evaluation (example)

- **In the previous case history, which one of the following treatment strategies do you choose?**

A. Cardiac defibrillation
B. IV adrenaline
C. CCU admission & CBR
D. IV morphine

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